

WHAT IS CLAIMED IS:

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1. A system for intraluminally delivering a bifurcated graft across a corporeal lumen, the corporeal lumen being formed of a superior vessel having a vessel bifurcation and extending into an ipsilateral vessel and a contralateral vessel, the system comprising:

5 a bifurcated graft formed of a superior member having a graft bifurcation and extending into an ipsilateral member and a contralateral member;

a set of positioning mechanisms capable of intraluminally positioning the bifurcated graft into the corporeal lumen;

10 a set of attaching mechanisms capable of attaching the superior member to the superior vessel, the ipsilateral member to the ipsilateral vessel, and the contralateral member to the contralateral vessel;

15 a main catheter housing the bifurcated graft, the set of positioning mechanisms, and the set of attaching mechanisms, the main catheter configured as a hollow cylindrical tube defining an inner diameter measuring less than seven millimeters;

whereby the bifurcated graft, the set of positioning mechanisms and the set of attaching mechanisms are housed within the main catheter for intraluminal delivery of the bifurcated graft.

2. The system of claim 1, wherein the set of attaching mechanisms includes an expandable anchor attached to the superior member of the bifurcated graft.

3. The system of the claim 2 wherein the expandable anchor is self expanding, and the set of attaching mechanisms further includes a release wire which releasably constricts the expandable anchor in an unexpanded condition.

4. The system of claim 2, wherein the set of attaching mechanisms further includes a balloon catheter capable of expanding the expandable anchor.

5. The system of claim 2, wherein the expandable anchor includes vessel engaging members.

6. The system of claim 1, wherein the set of attaching mechanisms includes a first expandable anchor attached to the superior member of the bifurcated graft and a second expandable anchor attached to the ipsilateral member of the bifurcated graft.

7. The system of claim 6 wherein the set of attaching mechanisms further includes a hollow cylinder extending throughout the main catheter and removably positioned within the ipsilateral member of the bifurcated graft.

8. The system of claim 7 wherein the set of attaching mechanisms further includes a release wire extending throughout the hollow cylinder and releasably attaching the hollow cylinder to the ipsilateral member of the bifurcated graft and the second expandable anchor.

9. The system of claim 8 wherein the expandable anchor is self-expanding and the release wire releasably constricts the second expandable anchor in an unexpanded condition.

10. The system of claim 6 wherein the second expandable anchor has a distal end and the set of positioning mechanisms further includes a first end cap disposed about the distal end of the second expandable anchor while the second expandable anchor is in an unexpanded condition.

11. The system of claim 1 wherein the set of attaching mechanisms includes a first expandable anchor attached to the superior member of the bifurcated graft, a second expandable anchor attached to the ipsilateral member of the bifurcated graft and a third expandable anchor attached to the contralateral member of the bifurcated graft.

12. The system of claim 1, wherein the set of positioning mechanisms includes a main guidewire.

13. The system of claim 1 wherein the set of positioning mechanisms includes a contralateral guidewire removably attached to the contralateral member of the bifurcated graft.

14. The system of claim 13 wherein the contralateral guidewire has a proximal end and a bulbous portion attached to said proximal end.

15. The system of claim 13 wherein the contralateral guidewire is configured as a stiffened rod.

16. The system of claim 13 wherein the contralateral guidewire is configured as a coiled wire.

17. The system of claim 11 wherein the second expandable anchor has a distal end, and the third expandable anchor has a distal end, and the set of positioning mechanisms further includes a first end cap disposed about the distal end of the second expandable anchor while the second expandable anchor is in an unexpanded

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condition, and a second end cap disposed about the distal end of the third expandable anchor while the third expandable anchor is in an unexpanded condition.

18. The system of claim 1 wherein the set of positioning mechanisms includes a secondary catheter encompassing at least a portion of the ipsilateral member of the bifurcated graft.

19. The system of claim 1 wherein the set of positioning mechanisms includes a secondary catheter encompassing at least a portion of the contralateral member of the bifurcated graft.

20. The system of claim 19 wherein the secondary catheter is folded within the main catheter for intraluminal delivery.

21. The system of claim 19 wherein the set of attachment mechanisms includes an expandable anchor attached to the contralateral member of the bifurcated graft and at least partially encompassed by the secondary catheter.

22. The system of claim 21 wherein the set of attachment mechanisms further includes a hollow cylinder extending throughout the secondary catheter and removably positioned within the contralateral member of the bifurcated graft.

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23. The system of claim 22 wherein the expandable anchor is self-expanding and the release wire releasably constricts the expandable anchor in an unexpanded condition.

24. The system of claim 1 further comprising:
a hollow metal cylinder attached within the main catheter and encompassing at least a portion of the bifurcated graft.

25. A system for placing a bifurcated graft in a lumen formed by a wall proximate a vascular bifurcation having an aneurysm, the system comprising:

a bifurcated graft having a superior extremity, an ipsilateral inferior extremity, and a contralateral inferior extremity;

a first anchoring mechanism attached to the superior extremity;

a second anchoring mechanism attached to the ipsilateral inferior extremity and configured to be self-expandable;

a third anchoring mechanism attached to the contralateral inferior extremity and configured to be self-expandable;

a first release wire releasably attached to the second anchoring mechanism such that the second anchoring mechanism maintains an unexpanded condition;

a second release wire releasably attached to the third anchoring mechanism such that the third anchoring mechanism maintains an unexpanded condition; and

a delivery catheter configured to contain the bifurcated graft, the first anchoring mechanism, the second anchoring mechanism, the third anchoring mechanism, the first release wire and the second release wire.

26. The system of claim 25, wherein the first anchoring mechanism is configured to be self-expanding, and the system further includes a third release wire releasably attached to the first anchoring mechanism such that the first anchoring mechanism maintains an unexpanded condition.

27. The system of claim 25, wherein the first anchoring mechanism includes a plurality of wall-engaging members.

28. The system of claim 25, further comprising:

a balloon catheter configured to expand the first anchoring mechanism into an expanded state.

29. The system of claim 25, further comprising:

a delivery catheter configured to encompass said system for intraluminal delivery.

30. The system of claim 29, wherein the delivery catheter has a generally tubular shape defining an interior diameter of less than 7 millimeters and greater than 6 millimeters.

31. The system of claim 25, further comprising:

a secondary catheter which encompasses at least a portion of the second anchoring mechanism.

32. The system of claim 31, further comprising:

a cylinder slideably disposed throughout the secondary catheter and encompassing the first release wire.

33. The system of claim 25, further comprising a secondary catheter which encompasses at least a portion of the third anchoring system.

34. The system of claim 33, wherein the secondary catheter is folded for intraluminal delivery.

35. The system of claim 33, further comprising a cylinder slideably disposed throughout the secondary catheter and encompassing the second release wire.

36. The system of claim 33, further comprising:

a guidewire disposed throughout the secondary catheter.

37. A method of positioning a bifurcated graft across a vascular bifurcation formed by an upstream vessel a first down stream vessel and a second downstream vessel using a bifurcated graft delivery system having a first catheter, a bifurcated graft formed by an upstream duct, a first downstream duct and a second downstream duct, disposed within the first catheter, a second catheter connected to the first downstream duct and disposed within the first catheter, and a third catheter connected to the second downstream duct and folded within the first catheter, and a snare guidewire comprising the steps of:

advancing the delivery system through the first downstream vessel and into the upstream vessel;

withdrawing the first catheter such that the bifurcated graft, the second catheter and the third catheter are exposed within the upstream vessel;

unfolding the third catheter;

advancing the snare guidewire through the second downstream vessel;

snaring the third catheter with the snare catheter;

pulling the first downstream duct into the first downstream vessel by withdrawing the second catheter; and

pulling the second downstream duct into the second downstream vessel by withdrawing the third catheter.

38 A method for repairing a bifurcated vascular vessel formed by an upstream vessel a first downstream vessel and a second downstream vessel using a bifurcated graft delivery system having a delivery catheter, a bifurcated graft formed by an upstream duct, a first downstream duct and a second downstream duct, disposed within the delivery catheter, a first expandable anchoring mechanism attached to the first downstream duct, said first expandable anchoring mechanism being self-expanding, a first release wire releasably fastened to the first expandable anchoring mechanism such that the first expandable anchoring mechanism is maintained in an unexpanded state, a second expandable anchoring mechanism attached to the second downstream duct, said second expandable anchoring mechanism being self-expanding, a second release wire releasably fastened to the second expandable anchoring mechanism such that the second expandable anchoring mechanism is maintained in an unexpanded state, and a third expandable anchoring mechanism attached to the upstream duct, comprising the steps of:

inserting the bifurcated graft delivery system intraluminally into the bifurcated vascular vessel;

withdrawing the delivery catheter such that the bifurcated graft is exposed within the bifurcated vascular vessel;

positioning the bifurcated graft within the bifurcated vascular vessel, such that the upstream duct extends into the upstream vessel, the first

downstream duct extends into the first downstream vessel, and the second downstream duct extends into the second downstream vessel;

anchoring the first downstream duct to the first downstream vessel by releasing the first release wire from the first downstream expandable anchoring mechanism whereby the first expandable downstream mechanism expands into the first downstream vessel;

anchoring the second downstream duct to the second downstream vessel by releasing the second release wire from the second downstream expandable anchoring mechanism whereby the second expandable downstream mechanism expands into the second downstream vessel;

anchoring the upstream duct to the upstream vessel by expanding the third expandable anchoring mechanism into the upstream vessel.

39. The method of claim 38, wherein

the third expandable anchoring mechanism is self-expanding;

the bifurcated graft delivery system further includes a third release wire releasably fastened to the third expandable anchoring mechanism such that the third expandable anchoring mechanism is maintained in an unexpanded state; and

the anchoring the upstream duct step includes releasing the third pullwire from the third downstream expandable mechanism whereby the third expandable anchoring mechanism expands into the upstream vessel.

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40. The method of claim 38, wherein the bifurcated graft delivery system includes a balloon catheter; and

the anchoring the upstream duct to the upstream vessel step includes inflating the balloon catheter such that the third expandable mechanism is expanded into the upstream vessel.

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